



Vertical migration of oil pollutant in profile of alluvial sediments of the Sava River, Serbia



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Introduction

One of the largest central heating plants in Belgrade, the Capitol of Serbia, is a heating plant in New Belgrade. Being located in the alluvial plains of the Sava River, it represents potential source of oil pollution for the whole alluvial area (Fig.1.)

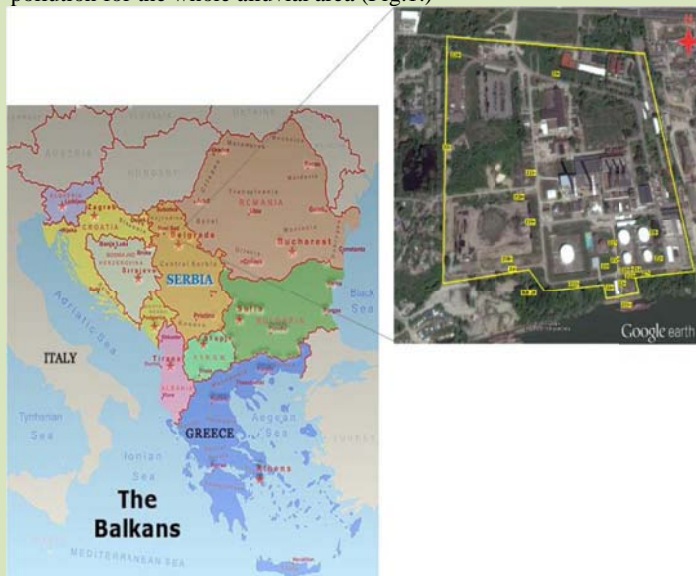


Fig.1. Maps of Belgrade (Capitol of Serbia) and microlocations of the alluvial plains of the Sava River.

Presence of different oil pollutants in the soils and sediments in this area has already been confirmed (Miletić et al, 2015). The aim of this work was to investigate compositional changes of oil pollutant during migration in vertical profile of the soil in this area.

In spring 2015 an extensive investigation of this soil was conducted. The soil was sampled from 20 micro locations and at 5 different depths (down to the depth of 2 m) making in total 100 of samples. A manual Eijkelkamp auger soil sampling device was used, with the appropriate augers. The sampled material was arranged in layers and for each micro location a lithologic profile was made. Most of the layers in the soil profile were characterized by high content of sand and low content of organic matter.

Materials & methods

From these soil samples extractable petroleum hydrocarbons were isolated with dichloromethane in a Soxhlet apparatus. The extracts were fractionated using column chromatography into fractions of: saturated hydrocarbons (Fraction I), aromatic hydrocarbons (Fraction II), and polar compounds (alcohols and keto compounds - Fraction III; Jovančićević et al, 2005).

Results & discussions

The results showed that in most of the extracts isolated polar compounds (Fraction III) were most abundant while saturated hydrocarbons (Fraction I) were least represented. This ratio between the fractions remained almost unaltered in different soil profiles in this area and at different depths (Fig.2.).

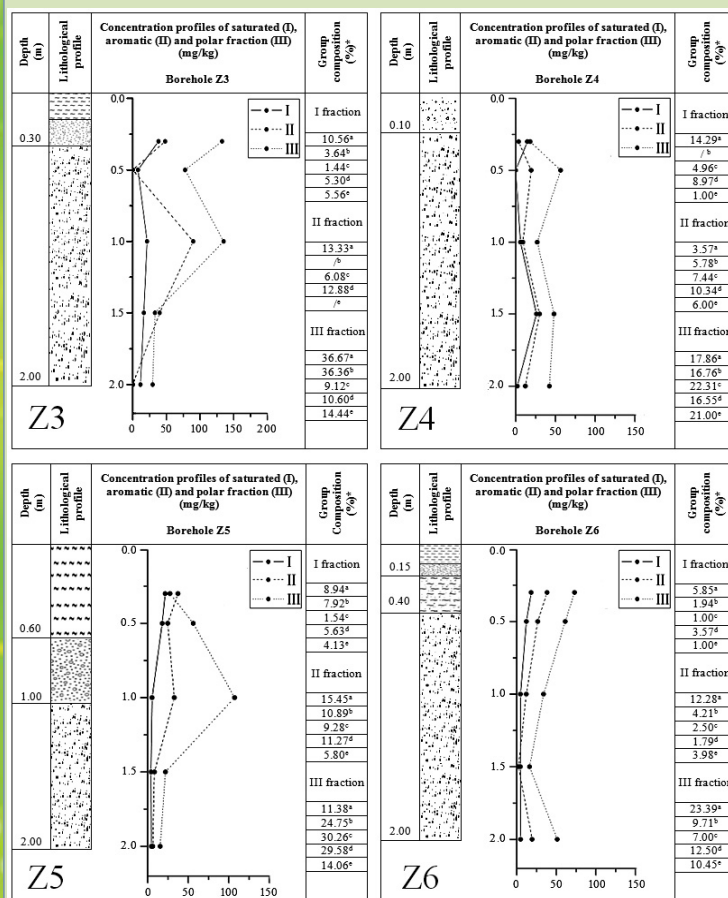


Fig.2. Vertical migration profiles of different organic fractions from samples Z3, Z4, Z5 and Z6.

Conclusions

It can be concluded that in these alluvial sediments oil pollutants can migrate almost unaltered to the depth of 2 m. Additionally, it can be presumed that penetration of unaltered oil pollutants in deeper layers of soil at this location is the result of characteristics of the surrounding soil environment.

References

- Jovančićević B. et al., (2005) Investigation of Interactions Between Surface Water and Petroleum Type Pollutants. Environmental Science and Pollution Research, 12, 205–212.
- Miletić S. et al., (2015) Oil pollution in the vicinity of a heating plant in New Belgrade (Serbia) – influence on the quality of the surrounding soil and sediments. 16th European Meeting on Environmental Chemistry, EMEC16, Book of Abstracts. November 30 – December 03. 2015, Torino, Italy.